# 74AVC9112

## 1-to-4 fan-out buffer

Rev. 2 — 8 July 2024 Product data sheet

## 1. General description

The 74AVC9112 is a 1-to-4 fan-out buffer suitable for use in clock distribution. It has a data input (A), four data outputs (Yn) and an output enable input ($\overline{OE}$). $V_{CC}$ can be supplied at any voltage between 0.8 V and 3.6 V. A HIGH on $\overline{OE}$ causes all outputs to be pulled LOW via pull-down resistors, a LOW on $\overline{OE}$ disconnects the pull-down resistors and enables all outputs.

Schmitt trigger action at all inputs makes the circuit tolerant for slower input rise and fall time.

The $I_{OFF}$ circuitry disables the output, preventing any damaging backflow current through the device when it is powered down.

## 2. Features and benefits

- Wide supply voltage range:
  - $V_{CC}$: 0.8 V to 3.6 V
- Inputs accept voltages up to 3.6 V
- Maximum data rates:
  - 380 Mbit/s (3.3 V)
  - 200 Mbit/s (2.5 V)
  - 200 Mbit/s (1.8 V)
  - 150 Mbit/s (1.5 V)
  - 100 Mbit/s (1.2 V)
- Latch-up performance exceeds 100 mA per JESD 78 Class II
- Complies with JEDEC standards:
  - JESD8-12 (0.8 V to 1.3 V)
  - JESD8-11 (0.9 V to 1.65 V)
  - JESD8-7 (1.2 V to 1.95 V)
  - JESD8-5 (1.8 V to 2.7 V)
  - JESD8-B (2.7 V to 3.6 V)
- ESD protection:
  - HBM: ANSI/ESDA/JEDEC JS-001 class 3B exceeds 8000 V
  - CDM: ANSI/ESDA/JEDEC JS-002 class C3 exceeds 1000 V
- Specified from -40 °C to +85 °C and -40 °C to +125 °C

## 3. Ordering information

**Table 1. Ordering information**

| Type number | Package | | | |
|---|---|---|---|---|
| | Temperature range | Name | Description | Version |
| 74AVC9112DC | -40 °C to +125 °C | VSSOP8 | plastic very thin shrink small outline package; 8 leads; body width 2.3 mm | SOT765-1 |
| 74AVC9112GT | -40 °C to +125 °C | XSON8 | plastic extremely thin small outline package; no leads; 8 terminals; body 1 × 1.95 × 0.5 mm | SOT833-1 |

## 4. Marking

**Table 2. Marking codes**

| Type number | Marking code |
|---|---|
| 74AVC9112DC | Bb |
| 74AVC9112GT | Bb |

## 5. Functional diagram

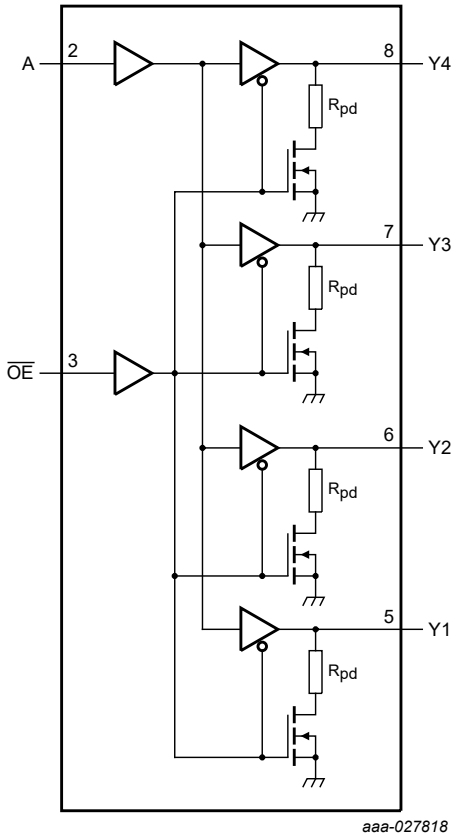



**Fig. 1. Logic symbol**

# 6. Pinning information

## 6.1. Pinning

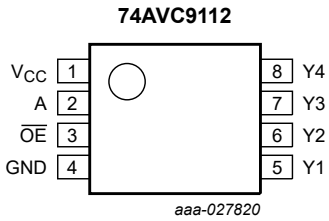



Fig. 2. Pin configuration SOT765-1 (VSSOP8)

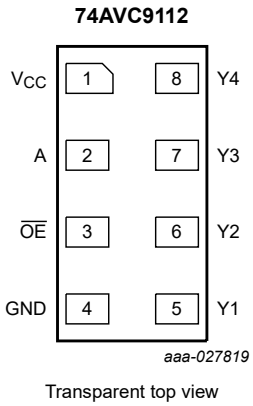



Fig. 3. Pin configuration SOT833-1 (XSON8)

## 6.2. Pin description

**Table 3. Pin description**

| Symbol | Pin | Description |
|---|---|---|
| $V_{CC}$ | 1 | supply voltage |
| A | 2 | data input |
| $\overline{OE}$ | 3 | output enable input (active LOW) |
| GND | 4 | ground (0 V) |
| Y1, Y2, Y3, Y4 | 5, 6, 7, 8 | data outputs |

# 7. Functional description

**Table 4. Function table**

*H = HIGH voltage level; L = LOW voltage level; X = don't care.*

| Inputs | | Output |
|---|---|---|
| **$\overline{OE}$** | **A** | **Yn** |
| L | L | L |
| L | H | H |
| H | X | L |

# 8. Limiting values

**Table 5. Limiting values**

*In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages are referenced to GND (ground = 0 V).*

| Symbol | Parameter | Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{CC}$ | supply voltage | | -0.5 | +4.6 | V |
| $V_I$ | input voltage | [1] | -0.5 | +4.6 | V |
| $V_O$ | output voltage | $\overline{OE}$ = LOW [1] [2] | -0.5 | $V_{CC}$ + 0.5 | V |
| | | $\overline{OE}$ = HIGH [1] | -0.5 | +4.6 | V |
| $I_{IK}$ | input clamping current | $V_I$ < 0 V | -50 | - | mA |
| $I_{OK}$ | output clamping current | $V_O$ < 0 V | -50 | - | mA |
| $I_O$ | output current | $V_O$ = 0 V to $V_{CC}$ | - | ±50 | mA |
| $I_{CC}$ | supply current | | - | 100 | mA |
| $I_{GND}$ | ground current | | -100 | - | mA |
| $T_{stg}$ | storage temperature | | -65 | +150 | °C |
| $P_{tot}$ | total power dissipation | $T_{amb}$ = -40 °C to +125 °C [3] | - | 250 | mW |

[1] The minimum input voltage ratings and output voltage ratings may be exceeded if the input and output current ratings are observed.
[2] $V_{CC}$ + 0.5 V should not exceed 4.6 V.
[3] For SOT765-1 (VSSOP8) package: $P_{tot}$ derates linearly with 4.9 mW/K above 99 °C.
For SOT833-1 (XSON8) package: $P_{tot}$ derates linearly with 3.1 mW/K above 68 °C.

# 9. Recommended operating conditions

**Table 6. Recommended operating conditions**

| Symbol | Parameter | Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{CC}$ | supply voltage | | 0.8 | 3.6 | V |
| $V_I$ | input voltage | | 0 | 3.6 | V |
| $V_O$ | output voltage | $\overline{OE}$ = LOW | 0 | $V_{CC}$ | V |
| | | $\overline{OE}$ = HIGH | 0 | 3.6 | V |
| $T_{amb}$ | ambient temperature | | -40 | +125 | °C |
| Δt/ΔV | input transition rise and fall rate | $V_{CC}$ = 0.8 V to 3.6 V | 0 | 200 | ns/V |

## 10. Static characteristics

**Table 7. Static characteristics**

*At recommended operating conditions; voltages are referenced to GND (ground = 0 V).*

| Symbol | Parameter | Conditions | $T_{amb}$ = 25 °C | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| $V_{OH}$ | HIGH-level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$; $I_O$ = -1.5 mA; $V_{CC}$ = 0.8 V | - | 0.69 | - | V |
| $V_{OL}$ | LOW-level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$; $I_O$ = 1.5 mA; $V_{CC}$ = 0.8 V | - | 0.07 | - | V |
| $I_I$ | input leakage current | A, $\overline{OE}$ input; $V_I$ = 0 V or 3.6 V; $V_{CC}$ = 0.8 V to 3.6 V | - | ±0.025 | ±0.25 | µA |
| $I_{OFF}$ | power-off leakage current | $V_I$ or $V_O$ = 0 V to 3.6 V; $V_{CC}$ = 0 V | - | ±0.1 | ±1 | µA |
| $R_{pd}$ | pull-down resistance | | - | 50 | - | kΩ |
| $C_I$ | input capacitance | A, $\overline{OE}$ input; $V_I$ = 0 V or 3.3 V; $V_{CC}$ = 3.3 V | - | 1.2 | - | pF |
| $C_O$ | output capacitance | Yn; $V_O$ = 3.3 V or 0 V; $V_{CC}$ = 3.3 V | - | 4.7 | - | pF |

**Table 8. Static characteristics**

*At recommended operating conditions; voltages are referenced to GND (ground = 0 V).*

| Symbol | Parameter | Conditions | $T_{amb}$ = -40 °C to +85 °C | | $T_{amb}$ = -40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|
| | | | Min | Max | Min | Max | |
| $V_{IH}$ | HIGH-level input voltage | A, $\overline{OE}$ input | | | | | |
| | | $V_{CC}$ = 0.8 V | 0.70$V_{CC}$ | - | 0.70$V_{CC}$ | - | V |
| | | $V_{CC}$ = 1.1 V to 1.95 V | 0.65$V_{CC}$ | - | 0.65$V_{CC}$ | - | V |
| | | $V_{CC}$ = 2.3 V to 2.7 V | 1.6 | - | 1.6 | - | V |
| | | $V_{CC}$ = 3.0 V to 3.6 V | 2 | - | 2 | - | V |
| $V_{IL}$ | LOW-level input voltage | A, $\overline{OE}$ input | | | | | |
| | | $V_{CC}$ = 0.8 V | - | 0.30$V_{CC}$ | - | 0.30$V_{CC}$ | V |
| | | $V_{CC}$ = 1.1 V to 1.95 V | - | 0.35$V_{CC}$ | - | 0.35$V_{CC}$ | V |
| | | $V_{CC}$ = 2.3 V to 2.7 V | - | 0.7 | - | 0.7 | V |
| | | $V_{CC}$ = 3.0 V to 3.6 V | - | 0.8 | - | 0.8 | V |
| $V_{OH}$ | HIGH-level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$ | | | | | |
| | | $I_O$ = -100 µA; $V_{CC}$ = 0.8 V to 3.6 V | $V_{CC}$ - 0.1 | - | $V_{CC}$ - 0.1 | - | V |
| | | $I_O$ = -3 mA; $V_{CC}$ = 1.1 V | 0.85 | - | 0.85 | - | V |
| | | $I_O$ = -6 mA; $V_{CC}$ = 1.4 V | 1.05 | - | 1.05 | - | V |
| | | $I_O$ = -8 mA; $V_{CC}$ = 1.65 V | 1.2 | - | 1.2 | - | V |
| | | $I_O$ = -9 mA; $V_{CC}$ = 2.3 V | 1.75 | - | 1.75 | - | V |
| | | $I_O$ = -12 mA; $V_{CC}$ = 3.0 V | 2.3 | - | 2.3 | - | V |
| $V_{OL}$ | LOW-level output voltage | $V_I$ = $V_{IH}$ or $V_{IL}$ | | | | | |
| | | $I_O$ = 100 µA; $V_{CC}$ = 0.8 V to 3.6 V | - | 0.1 | - | 0.1 | V |
| | | $I_O$ = 3 mA; $V_{CC}$ = 1.1 V | - | 0.25 | - | 0.25 | V |
| | | $I_O$ = 6 mA; $V_{CC}$ = 1.4 V | - | 0.35 | - | 0.35 | V |
| | | $I_O$ = 8 mA; $V_{CC}$ = 1.65 V | - | 0.45 | - | 0.45 | V |
| | | $I_O$ = 9 mA; $V_{CC}$ = 2.3 V | - | 0.55 | - | 0.55 | V |
| | | $I_O$ = 12 mA; $V_{CC}$ = 3.0 V | - | 0.7 | - | 0.7 | V |

| Symbol | Parameter | Conditions | $T_{amb}$ = -40 °C to +85 °C | | $T_{amb}$ = -40 °C to +125 °C | | Unit |
|---|---|---|---|---|---|---|---|
| | | | Min | Max | Min | Max | |
| $I_I$ | input leakage current | A, $\overline{OE}$ input; $V_I$ = 0 V or 3.6 V; $V_{CC}$ = 0.8 V to 3.6 V | - | ±1 | - | ±5 | µA |
| $I_{OFF}$ | power-off leakage current | $V_I$ or $V_O$ = 0 V to 3.6 V; $V_{CC}$ = 0 V | - | ±5 | - | ±30 | µA |
| $I_{CC}$ | supply current | $V_I$ = 0 V or $V_{CC}$; $I_O$ = 0 A; $V_{CC}$ = 0.8 V to 3.6 V | - | 8 | - | 50 | µA |

# 11. Dynamic characteristics

### Table 9. Typical dynamic characteristics

*Voltages are referenced to GND (ground = 0 V); for test circuit, see Fig. 6; for waveforms, see Fig. 4 and Fig. 5.*

| Symbol | Parameter | Conditions | | $V_{CC}$ = 0.8 V | Unit |
|---|---|---|---|---|---|
| $t_{pd}$ | propagation delay | A to Yn; $T_{amb}$ = 25 °C | [1] | 31 | ns |
| $t_{dis}$ | disable time | $\overline{OE}$ to Yn; $T_{amb}$ = 25 °C | [2] | 25 | ns |
| $t_{en}$ | enable time | $\overline{OE}$ to Yn; $T_{amb}$ = 25 °C | [3] | 36 | ns |

[1] $t_{pd}$ is the same as $t_{PLH}$ and $t_{PHL}$;
[2] $t_{dis}$ is the same as $t_{PLZ}$ and $t_{PHZ}$;
[3] $t_{en}$ is the same as $t_{PZL}$ and $t_{PZH}$.

### Table 10. Dynamic characteristics

*Voltages are referenced to GND (ground = 0 V); for test circuit, see Fig. 6; for waveforms, see Fig. 4 and Fig. 5.*

| Symbol | Parameter | Conditions | | $V_{CC}$ | | | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1.2 V ± 0.1 V | | 1.5 V ± 0.1 V | | 1.8 V ± 0.15 V | | 2.5 V ± 0.2 V | | 3.3 V ± 0.3 V | | |
| | | | | Min | Max | Min | Max | Min | Max | Min | Max | Min | Max | |
| **$T_{amb}$ = -40 °C to +85 °C** | | | | | | | | | | | | | | |
| $t_{pd}$ | propagation delay | A to Yn | [1] | 0.9 | 14.7 | 0.7 | 9.5 | 0.6 | 7.6 | 0.5 | 5.4 | 0.4 | 4.4 | ns |
| $t_{dis}$ | disable time | $\overline{OE}$ to Yn | [2] | 1.0 | 14.7 | 0.8 | 9.7 | 0.8 | 8.8 | 0.6 | 6.5 | 0.7 | 6.9 | ns |
| $t_{en}$ | enable time | $\overline{OE}$ to Yn | [3] | 1.0 | 15.8 | 0.7 | 9.9 | 0.6 | 7.9 | 0.5 | 5.5 | 0.5 | 4.5 | ns |
| $t_{sk(o)}$ | output skew time | between any output | | - | 0.7 | - | 0.4 | - | 0.3 | - | 0.2 | - | 0.2 | ns |
| **$T_{amb}$ = -40 °C to +125 °C** | | | | | | | | | | | | | | |
| $t_{pd}$ | propagation delay | A to Yn | [1] | 0.9 | 15.7 | 0.7 | 10.4 | 0.6 | 8.3 | 0.5 | 5.9 | 0.4 | 4.9 | ns |
| $t_{dis}$ | disable time | $\overline{OE}$ to Yn | [2] | 1.0 | 16.5 | 0.8 | 11.0 | 0.8 | 10.0 | 0.6 | 7.5 | 0.7 | 7.7 | ns |
| $t_{en}$ | enable time | $\overline{OE}$ to Yn | [3] | 1.0 | 16.9 | 0.7 | 10.9 | 0.6 | 8.7 | 0.6 | 6.1 | 0.5 | 4.9 | ns |
| $t_{sk(o)}$ | output skew time | between any output | | - | 0.9 | - | 0.5 | - | 0.4 | - | 0.3 | - | 0.2 | ns |

[1] $t_{pd}$ is the same as $t_{PLH}$ and $t_{PHL}$;
[2] $t_{dis}$ is the same as $t_{PLZ}$ and $t_{PHZ}$;
[3] $t_{en}$ is the same as $t_{PZL}$ and $t_{PZH}$.

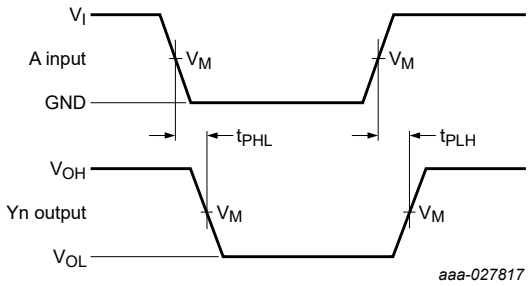
**Table 11. Typical power dissipation capacitance at $T_{amb}$ = 25 °C**

| Symbol | Parameter | Conditions | | $V_{CC}$ | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 0.8 V | 1.2 V | 1.5 V | 1.8 V | 2.5 V | 3.3 V | |
| $C_{PD}$ | power dissipation capacitance | Yn; outputs enabled | [1] [2] | 35 | 35 | 36 | 37 | 40 | 45 | pF |
| | | Yn; outputs disabled | [1] [2] | 2.0 | 2.2 | 2.3 | 2.4 | 2.6 | 2.7 | pF |

[1] $C_{PD}$ is used to determine the dynamic power dissipation ($P_D$ in µW).
$P_D = C_{PD} \times V_{CC}^2 \times f_i + \Sigma(C_L \times V_{CC}^2 \times f_o)$ where:
$f_i$ = input frequency in MHz;
$f_o$ = output frequency in MHz;
$C_L$ = load capacitance in pF;
$V_{CC}$ = supply voltage in V;
$\Sigma(C_L \times V_{CC}^2 \times f_o)$ = sum of the outputs.

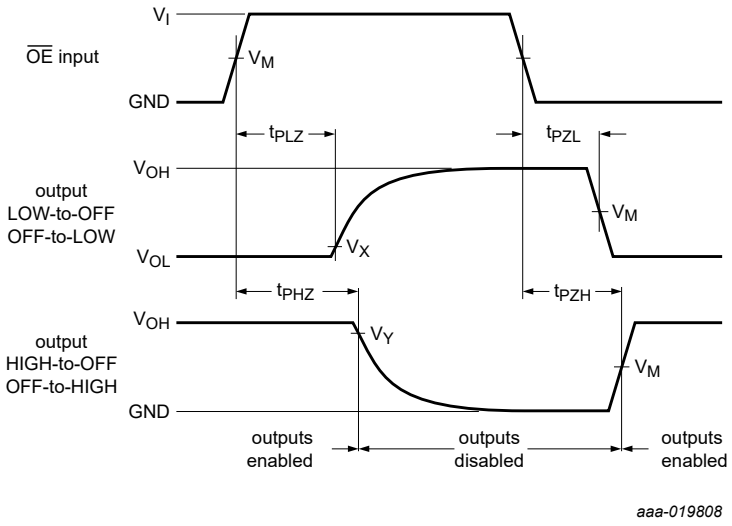
[2] $f_i$ = 10 MHz;
$V_I$ = GND to $V_{CC}$;
$t_r = t_f$ = 1 ns;
$C_L$ = 0 pF;
$R_L$ = ∞ Ω.

## 11.1. Waveforms and test circuit




Measurement points are given in Table 12.
$V_{OL}$ and $V_{OH}$ are typical output voltage levels that occur with the output load.

**Fig. 4. The data input (A) to output (Yn) propagation delay times**

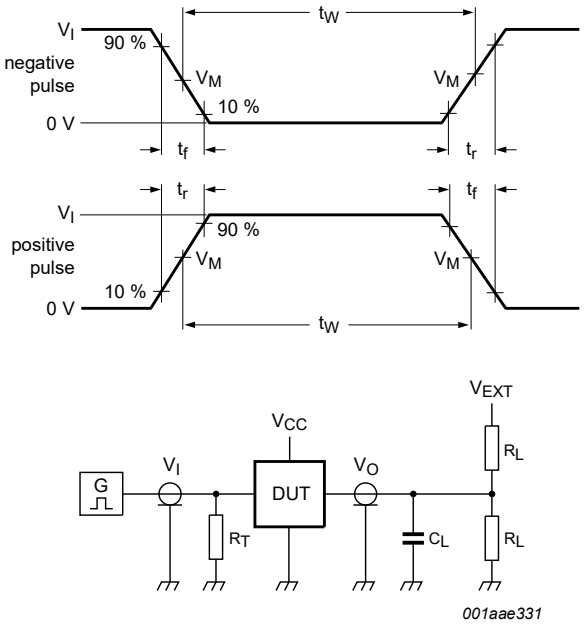



Measurement points are given in Table 12.
$V_{OL}$ and $V_{OH}$ are typical output voltage levels that occur with the output load.

**Fig. 5. Enable and disable times**

**Table 12. Measurement points**

| Supply voltage | Input | Output | | |
|---|---|---|---|---|
| $V_{CC}$ | $V_M$ | $V_M$ | $V_X$ | $V_Y$ |
| 0.8 V to 1.6 V | $0.5V_{CC}$ | $0.5V_{CC}$ | $V_{OL}$ + 0.1 V | $V_{OH}$ - 0.1 V |
| 1.65 V to 2.7 V | $0.5V_{CC}$ | $0.5V_{CC}$ | $V_{OL}$ + 0.15 V | $V_{OH}$ - 0.15 V |
| 3.0 V to 3.6 V | $0.5V_{CC}$ | $0.5V_{CC}$ | $V_{OL}$ + 0.3 V | $V_{OH}$ - 0.3 V |




Test data is given in Table 13

$R_L$ = Load resistance;

$C_L$ = Load capacitance including jig and probe capacitance;

$R_T$ = Termination resistance;

$V_{EXT}$ = External voltage for measuring switching times.

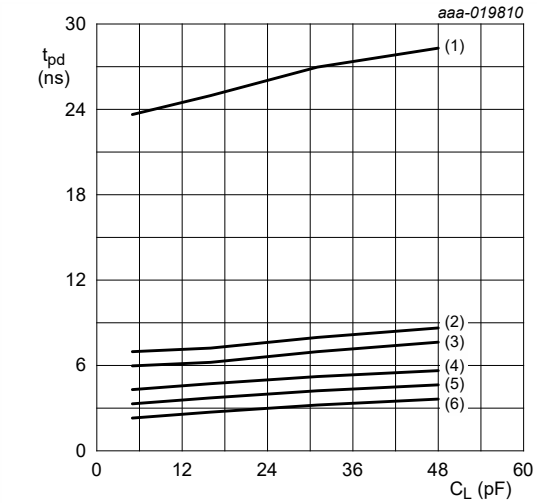
**Fig. 6. Test circuit for measuring switching times**

**Table 13. Test data**

| Supply voltage | Input | | Load | | $V_{EXT}$ | | |
|---|---|---|---|---|---|---|---|
| $V_{CC}$ | $V_I$ | $\Delta t/\Delta V$[1] | $C_L$ | $R_L$ | $t_{PLH}$, $t_{PHL}$ | $t_{PZH}$, $t_{PHZ}$ | $t_{PZL}$, $t_{PLZ}$ |
| 0.8 V to 1.6 V | $V_{CC}$ | ≤ 1.0 ns/V | 15 pF | 2 kΩ | open | GND | $2V_{CC}$ |
| 1.65 V to 2.7 V | $V_{CC}$ | ≤ 1.0 ns/V | 15 pF | 2 kΩ | open | GND | $2V_{CC}$ |
| 3.0 V to 3.6 V | $V_{CC}$ | ≤ 1.0 ns/V | 15 pF | 2 kΩ | open | GND | $2V_{CC}$ |

[1] dV/dt ≥ 1.0 V/ns

## 11.2. Typical propagation delay characteristics

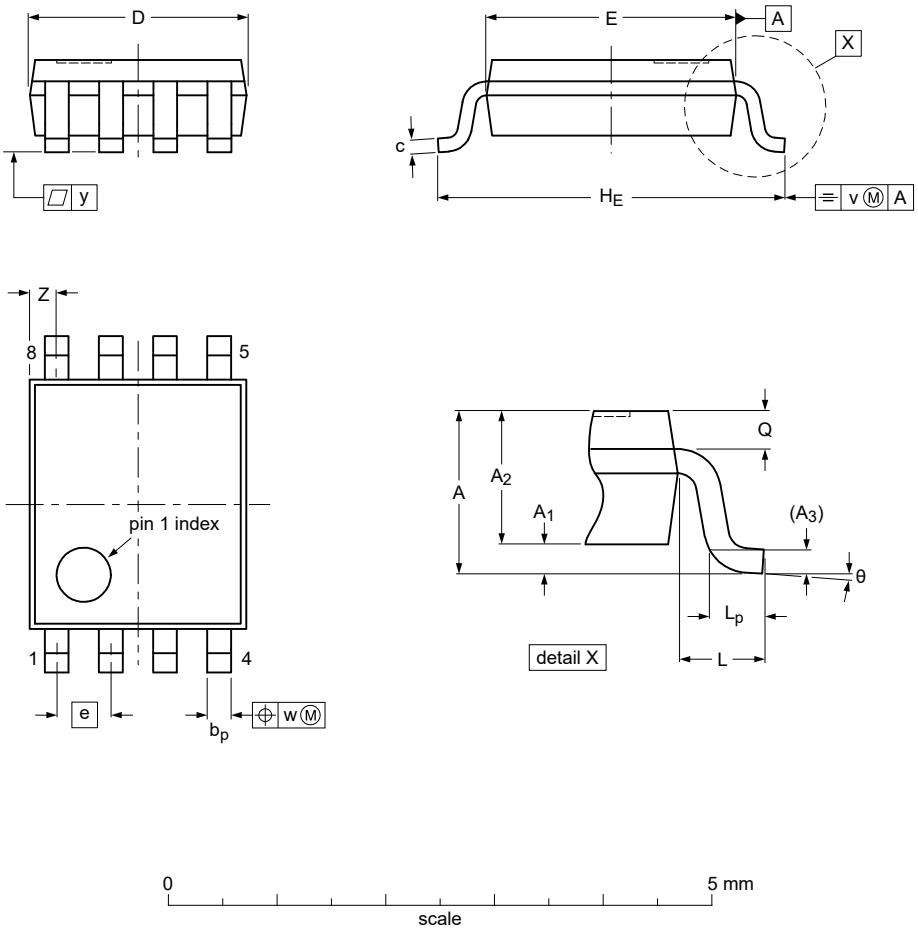



(1) $V_{CC}$ = 0.8 V
(2) $V_{CC}$ = 1.2 V
(3) $V_{CC}$ = 1.5 V
(4) $V_{CC}$ = 1.8 V
(5) $V_{CC}$ = 2.5 V
(6) $V_{CC}$ = 3.3 V

**Fig. 7. Typical propagation delay versus load capacitance; $T_{amb}$ = 25 °C**

## 12. Package outline

**VSSOP8: plastic very thin shrink small outline package; 8 leads; body width 2.3 mm** **SOT765-1**




Dimensions (mm are the original dimensions)

| Unit | | A max. | $A_1$ | $A_2$ | $A_3$ | $b_p$ | c | $D^{(1)}$ | $E^{(2)}$ | e | $H_E$ | L | $L_p$ | Q | v | w | y | $Z^{(1)}$ | θ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | max | 1 | 0.15 | 0.85 | 0.12 | 0.27 | 0.23 | 2.1 | 2.4 | 0.5 | 3.2 | 0.4 | 0.40 | 0.21 | 0.2 | 0.08 | 0.1 | 0.4 | 8° |
| | nom | | | | | | | | | | | | | | | | | | |
| | min | | 0.00 | 0.60 | | 0.17 | 0.08 | 1.9 | 2.2 | | 3.0 | | 0.15 | 0.19 | | | | 0.1 | 0° |

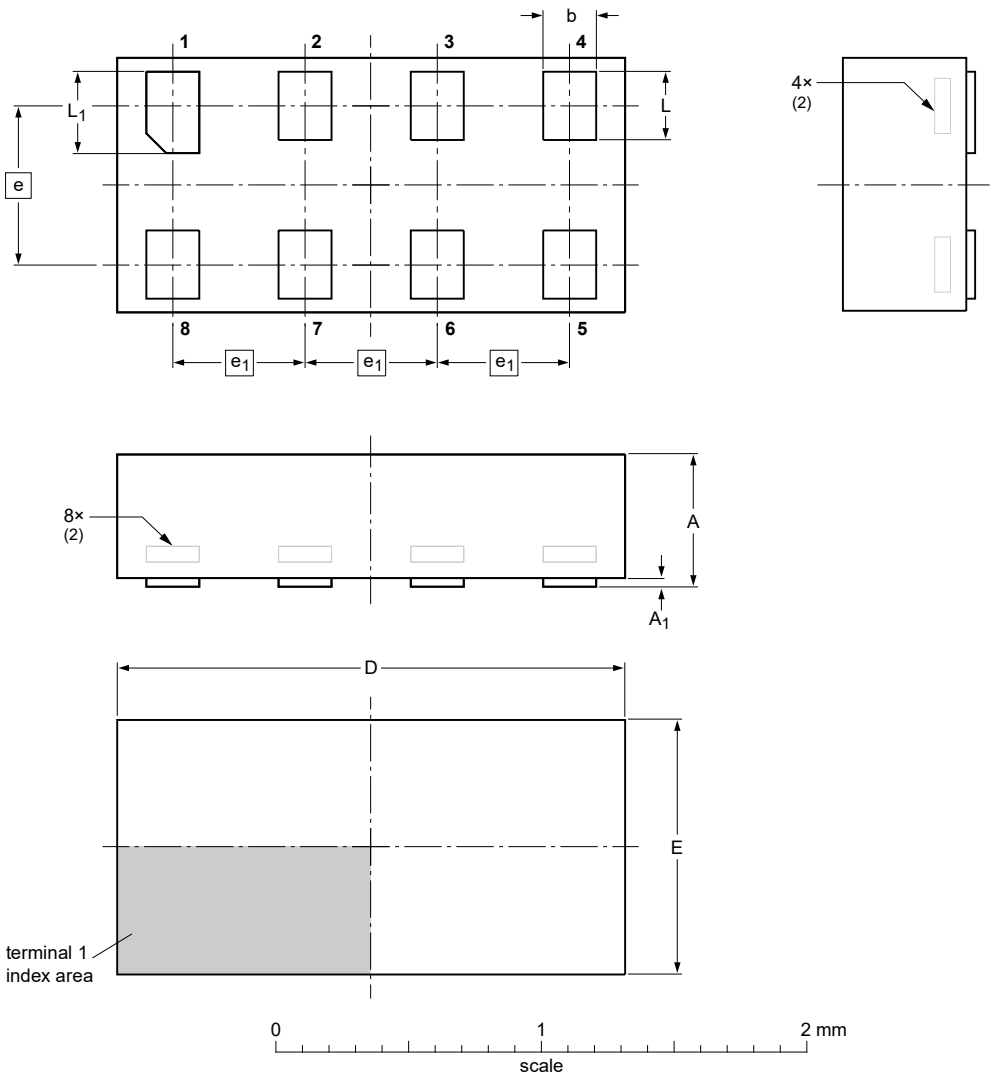
Note
1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.
2. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

*sot765-1_po*

| Outline version | References | | | | European projection | Issue date |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT765-1 | | MO-187 | | | | ~~07-06-02~~ 16-05-31 |

**Fig. 8. Package outline SOT765-1 (VSSOP8)**

**XSON8: plastic extremely thin small outline package; no leads; 8 terminals; body 1 x 1.95 x 0.5 mm** **SOT833-1**




**DIMENSIONS (mm are the original dimensions)**

| UNIT | A(1) max | $A_1$ max | b | D | E | e | $e_1$ | L | $L_1$ |
|---|---|---|---|---|---|---|---|---|---|
| mm | 0.5 | 0.04 | 0.25<br>0.17 | 2.0<br>1.9 | 1.05<br>0.95 | 0.6 | 0.5 | 0.35<br>0.27 | 0.40<br>0.32 |

**Notes**

1. Including plating thickness.
2. Can be visible in some manufacturing processes.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT833-1 | - - - | MO-252 | - - - | | | ~~07-11-14~~<br>07-12-07 |

**Fig. 9. Package outline SOT833-1 (XSON8)**

# 13. Abbreviations

**Table 14. Abbreviations**

| Acronym | Description |
|---|---|
| ANSI | American National Standards Institute |
| CDM | Charged Device Model |
| DUT | Device Under Test |
| ESD | ElectroStatic Discharge |
| ESDA | ElectroStatic Discharge Association |
| HBM | Human Body Model |
| JEDEC | Joint Electron Device Engineering Council |

# 14. Revision history

**Table 15. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| 74AVC9112 v.2 | 20240708 | Product data sheet | - | 74AVC9112 v.1 |
| Modifications: | • Section 2: ESD specification updated according to the latest JEDEC standard. | | | |
| 74AVC9112 v.1 | 20180423 | Product data sheet | - | - |

# 15. Legal information

## Data sheet status

| Document status [1][2] | Product status [3] | Definition |
|---|---|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
| Product [short] data sheet | Production | This document contains the product specification. |

[1] Please consult the most recently issued document before initiating or completing a design.
[2] The term 'short data sheet' is explained in section "Definitions".
[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at https://www.nexperia.com.

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**Date of release: 8 July 2024**